

FIG. 1

204290" 5844E01

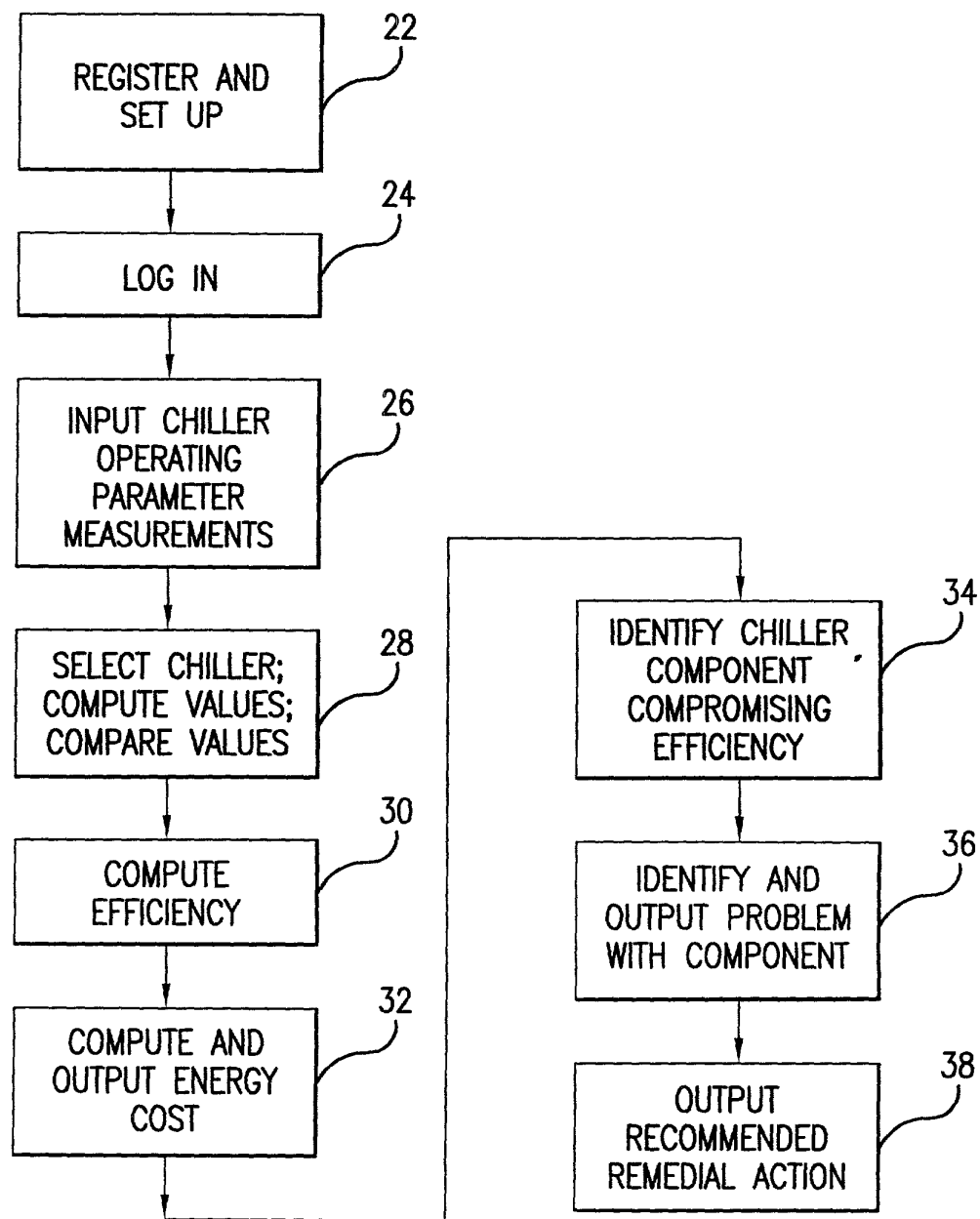


FIG.2

2044293 5844E001

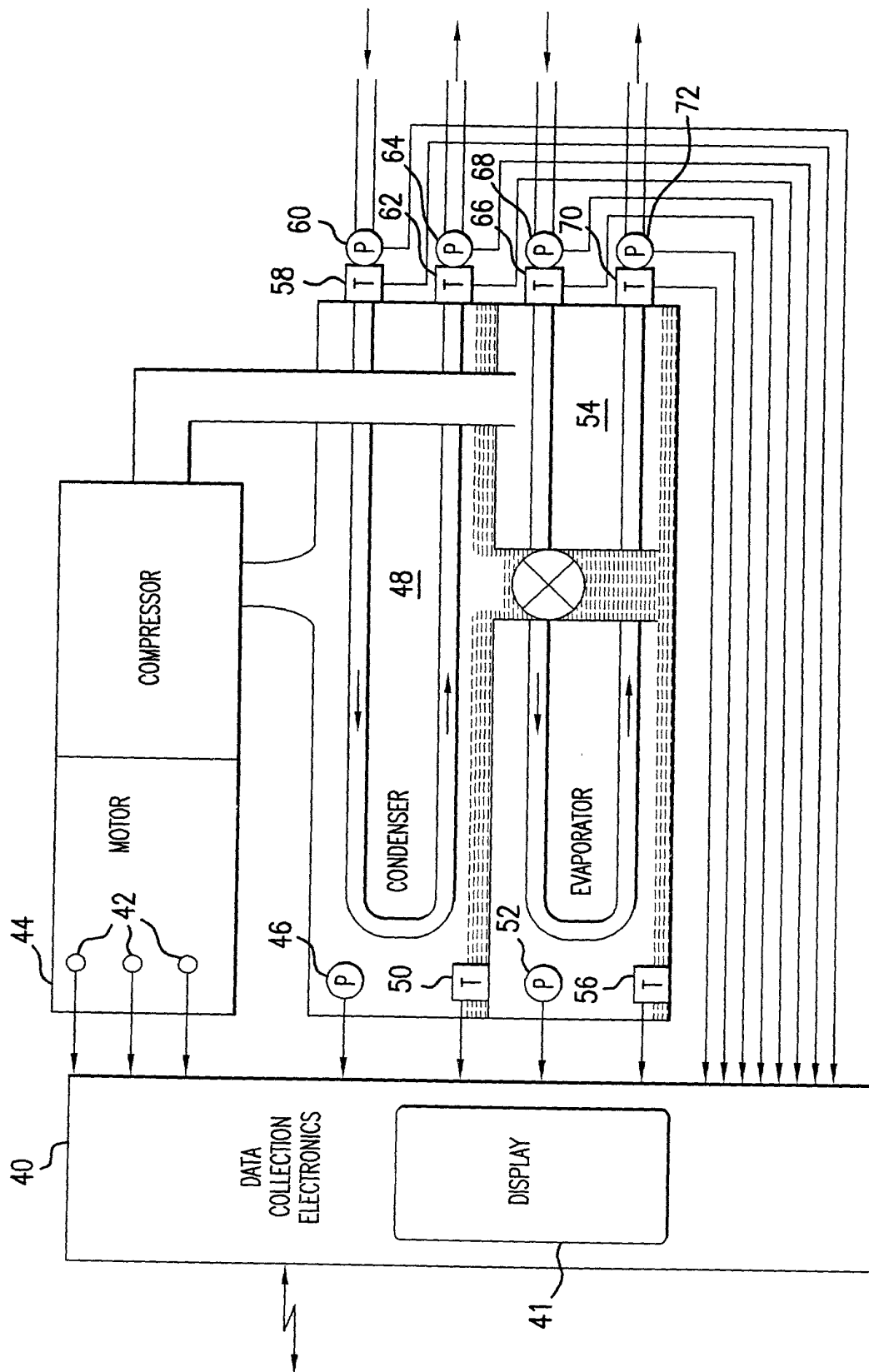


FIG.3

FIG. 4

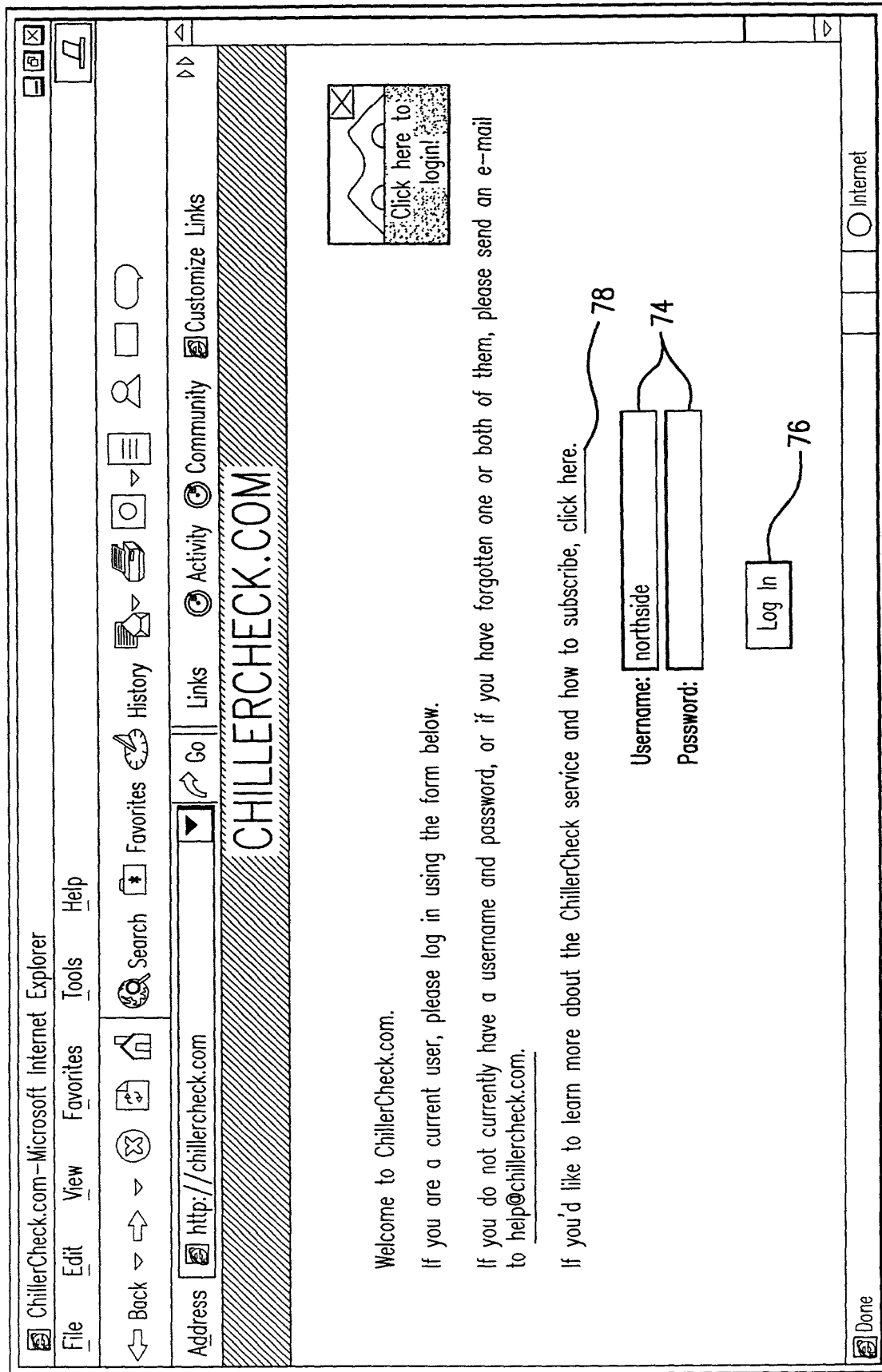
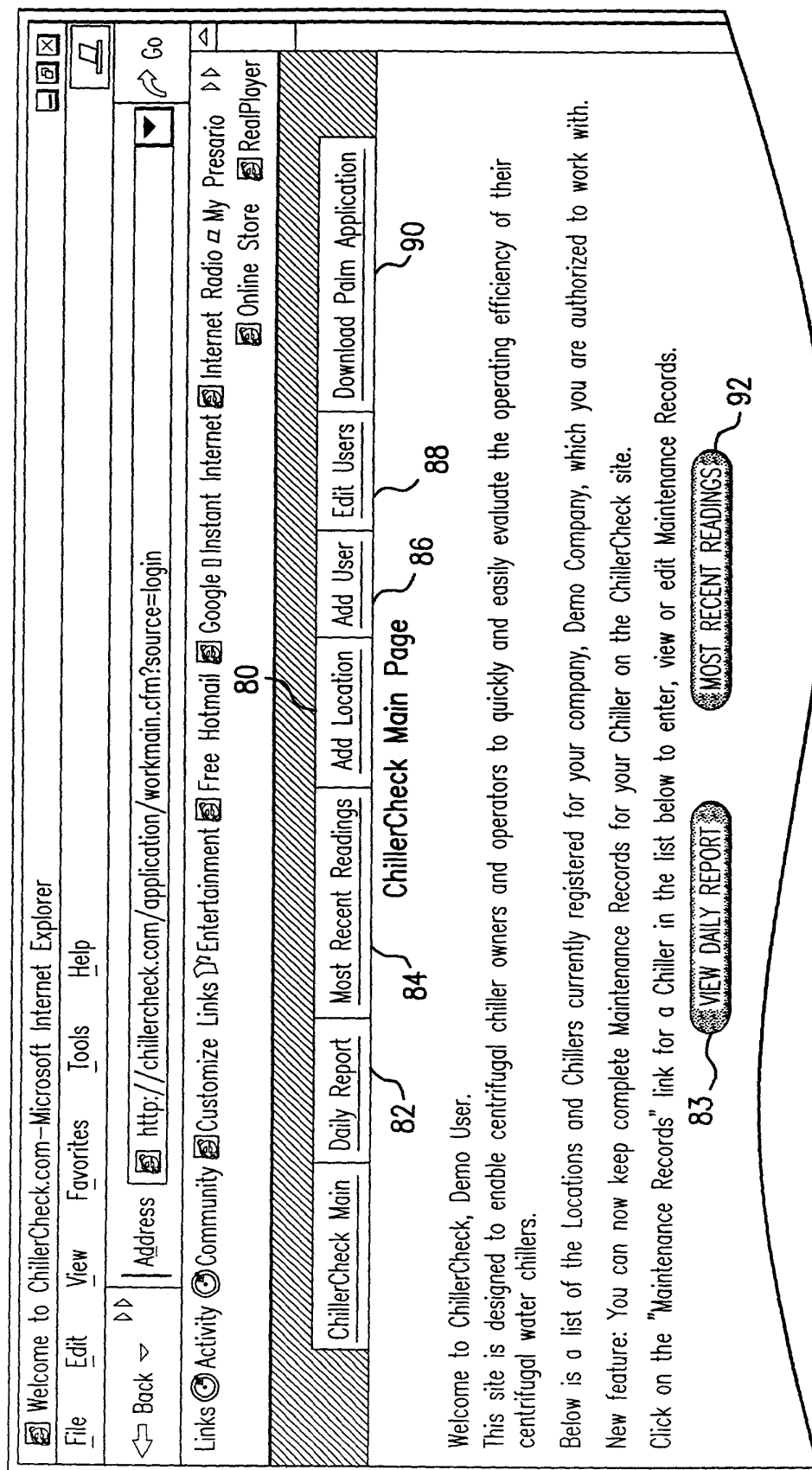


FIG. 4

204290" 5847E007



CONT'D ON FIG.5-1

FIG.5

204290" 5824E00T

CONT'D FROM FIG. 5-1

Please click on the appropriate link to work with the information below.

If a red * appears next to the Chiller #, some necessary information has not yet been set up for the chiller. Click on the "Alert" link to see details.

Admin Bldg.	160	162	167	156	152	158
Chiller #: 2	View Logsheet	Add Chiller to this Location	Log Records	Maintenance Records	Edit Location Information	Delete this Location
Central Plant			Add Chiller to this Location	Maintenance Records	Edit Chiller Information	Delete this Chiller
Chiller #: 1	View Logsheet		Log Records	Maintenance Records	Edit Location Information	Delete this Location
Chiller #: 2	View Logsheet		Log Records	Maintenance Records	Edit Chiller Information	Delete this Chiller
160						154
162						158
167						Internet

FIG. 5-1

CHILLERCHECK.COM

ChillerCheck Main	Daily Report	Most Recent Readings	Add Location	Add User	Edit Users	Download Palm Application
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82 84 Add a Chiller at Atlanta Office Bldg. 86 88 90

Please fill in all information in the form below, then click the "Add Chiller" button.

You will then be taken back to the ChillerCheck Main page, where you can work with any of your Location, Chiller or Chiller Log records.

Note: If you do not have all the information below available at this time, you can still add the Chiller by filling out only the required information (marked with an * below) now. You can come back later and add the rest of the information. However, you will not be able to make efficiency calculations or graph trends until all Chiller information has been recorded.

Chiller Information

Help! * Chiller #:	<input type="text"/>	96
* Make:	Choose a Make ▾	98
Help! * Model:	<input type="text"/>	100
Help! Serial #:	<input type="text"/>	102
Help! * Refrigerant Type:	Choose a refrigerant ▾	104
Help! Year Chiller Was Manufactured:	Choose a year of manufacture ▾	106
Help! * Efficiency Rating (kw/ton):	<input type="text"/>	108
Help! * Energy Cost (\$/kw hour):	<input type="text"/>	110

FIG. 6A

Help! * Weekly Hrs. of Operation:	<input type="text"/> ~ 112
Help! * Weeks Per Year of Operation:	<input type="text"/> ~ 114
Help! * Average Load Profile:	<input type="text"/> % ~ 116
Help! * Tons:	<input type="text"/> ~ 118
Help! * Design Voltage:	<input type="text"/> ~ 120
Help! * Full-Load Amperage:	<input type="text"/> ~ 122
<i>Now we need some information about the Condenser.</i>	
Help! Design Condenser Water Pressure Drop: (This value may be omitted if necessary, but your calculations will be more accurate if you have it. If you enter a value, you must choose a unit of measure.)	<input type="text"/> ~ 124 <input type="text" value="Choose a pressure unit"/> ~ 126
Help! Please choose a unit of measurement for the Actual Condenser Water Pressure Drop:	<input type="text" value="Choose a pressure unit"/> ~ 128
Help! Please choose a unit of measurement for Condenser Pressure:	<input type="text" value="Choose a pressure unit"/> ~ 130
Design Condenser Approach Temp: (This Value may be omitted if you do not have it.)	<input type="text"/> ~ 132

FIG. 6B

10034785-062402

Now we need some information about the Evaporator.

<p>Help! Design Chill Water Pressure Drop: (This value may be omitted if necessary, but your calculations will be more accurate if you have it. If you enter a value, you must choose a unit of measure.)</p>	<div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; width: 100px; height: 20px;"></div> <div>Choose a pressure unit ▾</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> 134 136 </div>
<p>Help! Please choose a unit of measurement for the Actual Chill Water Pressure Drop:</p>	<div style="display: flex; justify-content: space-between;"> <div>Choose a pressure unit ▾</div> 138 </div>
<p>Help! Please choose a unit of measurement for Evaporator Pressure:</p>	<div style="display: flex; justify-content: space-between;"> <div>Choose a pressure unit ▾</div> 140 </div>
<p>Help! Design Evaporator Approach Temp: (This value may be omitted if you do not have it.)</p>	<div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; width: 100px; height: 20px;"></div> 142 </div>
<p>Help! Evaporator Design Outlet Water Temp:</p>	<div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; width: 100px; height: 20px;"></div> 144 </div>
<p style="text-align: center;"><i>Please choose a method of calculating Oil Pressure Differential for the Compressor.</i></p>	
<p>Help! Calculate Differential by:</p>	<div style="display: flex; justify-content: space-between;"> <div>Choose a method ▾</div> 146 </div>

FIG. 6C

There are just a few more things we need to know about this chiller.

Does the chiller have a readout for Purge Run Time?	<input type="radio"/> Yes <input type="radio"/> No 143
If so, is the Purge Run Time measured only in minutes, or in both hours and minutes?	<input type="radio"/> Minutes Only <input type="radio"/> Hours and Minutes 145
Please set a maximum amount of Purge Run Time per day you wish to allow before you are sent an alert.	<input type="text"/> Minutes 147
Does this chiller have a readout for Bearing Temperature?	<input type="radio"/> Yes <input type="radio"/> No 149
Operator Notes: (Enter any notes you might want to record about this chiller.)	<div style="border: 1px solid black; height: 100px; width: 100%; position: relative;"> <div style="position: absolute; top: 5px; right: 5px;"> <div style="text-align: center;">▲</div> <div style="text-align: center;">▼</div> </div> <div style="position: absolute; bottom: 10px; right: 10px;">148</div> <div style="position: absolute; top: 50%; left: 50%; transform: translate(-50%, -50%);">150</div> </div>
<div style="border: 1px solid black; padding: 5px; display: inline-block;">Add Chiller Info</div>	

FIG. 6D

CONT'D FROM FIG.7

FIG. 7-1

204290" sheet

Log Sheet-Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Address <http://chillercheck.com/application/logsheets.cfm?ChillerID=136> Go

Links Activity Community Customization Links Entertainment Free Hotmail Google Instant Internet Internet Radio My Presario Online Store RealPlayer

163 165 CHILLERCHECK.COM 170 172

ChillerCheck Main Chiller #2 Main Page Maint. Records Add Maint. Record Add Log Record View Logsheet Chart Trends

Log Sheet for Chiller #: 2 at Admin Bldg 178

Condenser				Evaporator				Compressor				Electrical			
Inlet Temp				Inlet Temp				Oil Temp				Volts Phase 1			
Outlet Temp				Outlet Temp				Oil Temp				Volts Phase 2			
Refrig Temp				Refrig Temp				Oil Temp				Volts Phase 3			
Excess Approach				Excess Approach				Oil Temp				Volts Phase 1			
Non-cond Lb				Pressure Drop				Pressure Drop				Volts Phase 2			
Pressure				Pressure				Pressure Drop				Volts Phase 3			
Excess Approach				Excess Approach				Pressure Drop				Volts Phase 1			
Refrig Temp				Refrig Temp				Oil Temp				Volts Phase 2			
Outlet Temp				Outlet Temp				Oil Temp				Volts Phase 3			
Inlet Temp				Inlet Temp				Oil Temp				Volts Phase 1			
Run Hours				Run Hours				Run Hours				Volts Phase 2			
Run Hours				Run Hours				Run Hours				Volts Phase 3			

To view an efficiency analysis, click on the Reading Date.

CONT'D ON FIG.8-1

FIG.8

CONT'D ON FIG.8-1

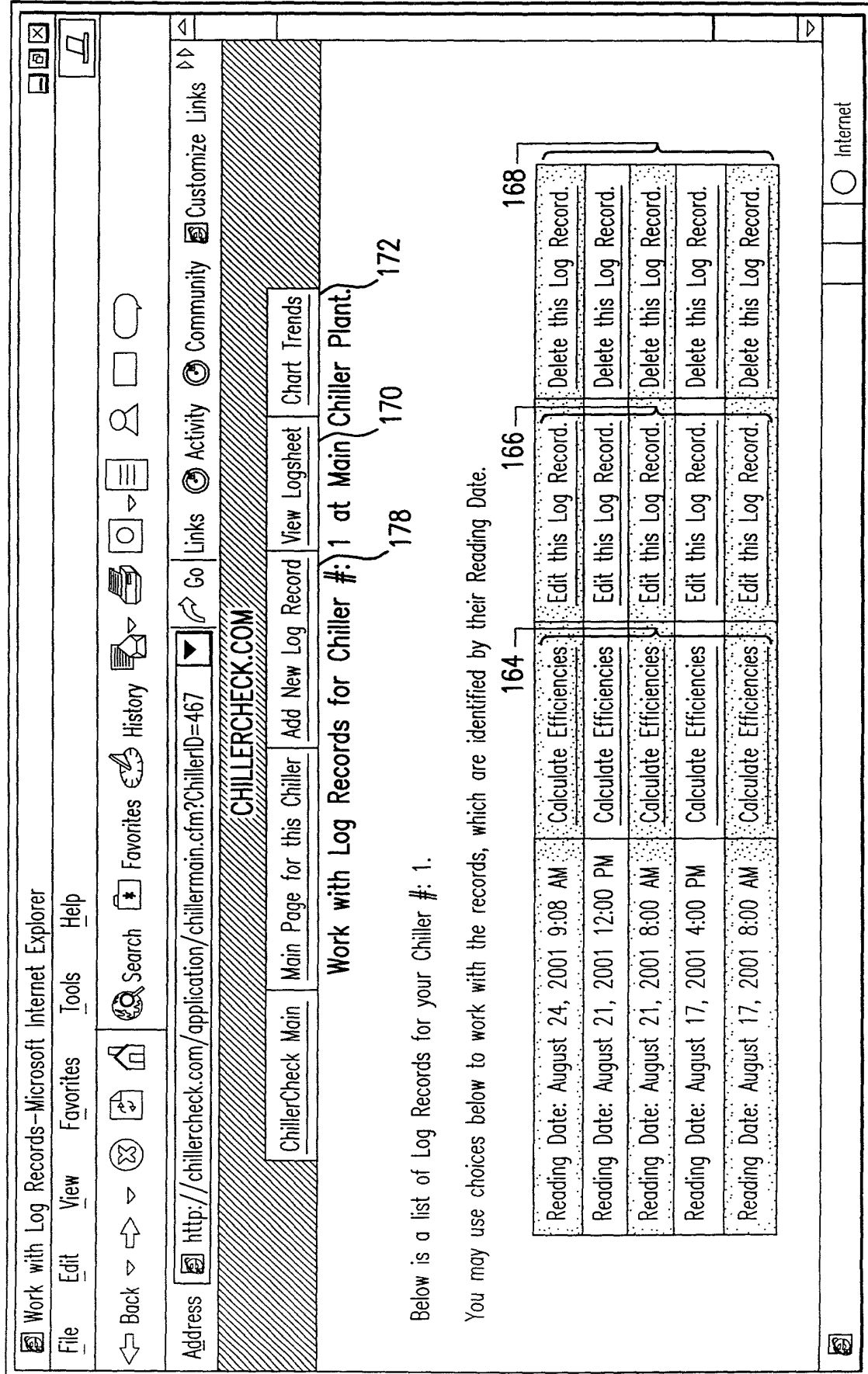


FIG. 9

204290" SHEET

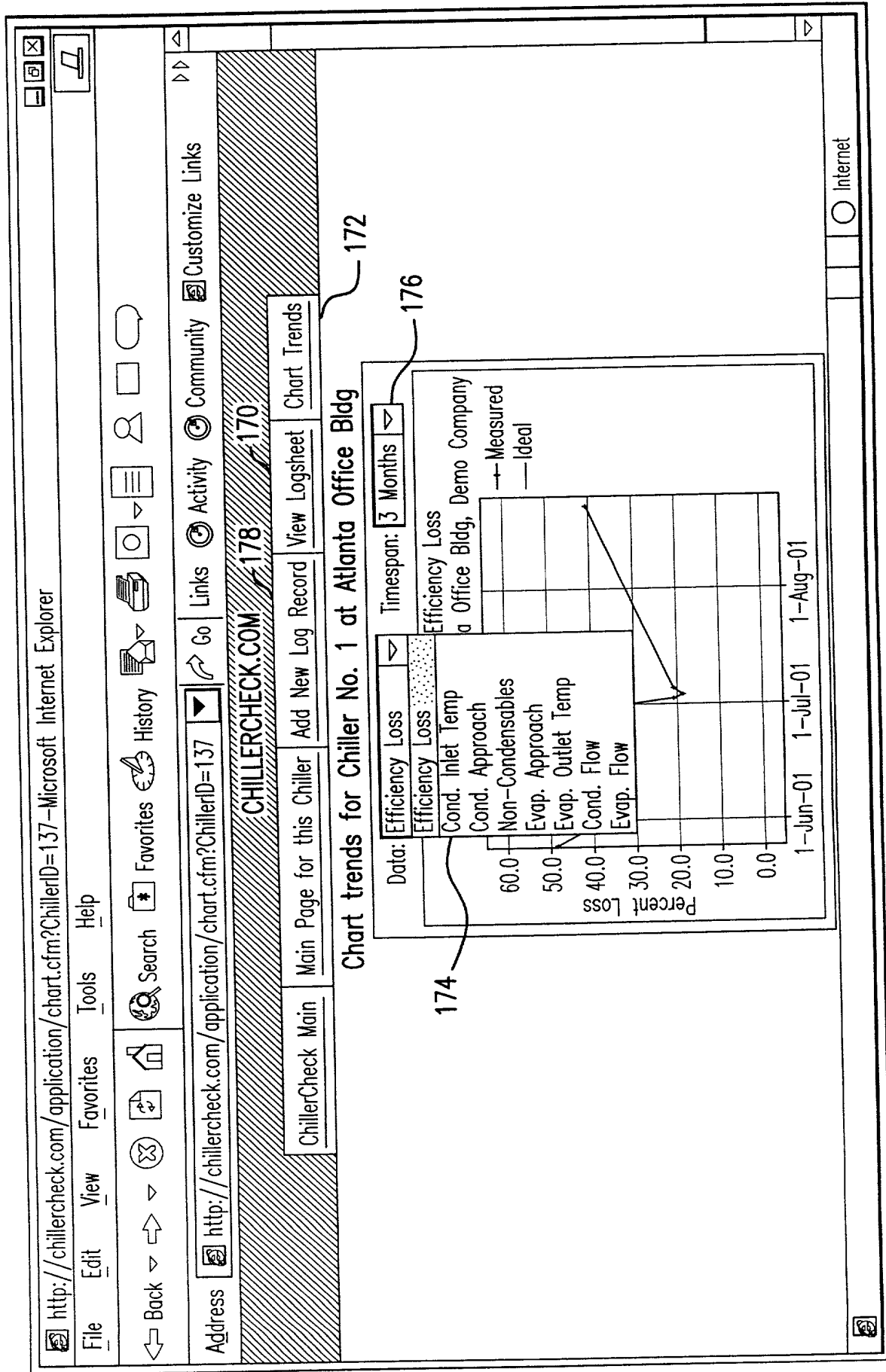


FIG.10

CHILLERCHECK.COM

170
172

ChillerCheck Main
Main Page for this Chiller
Add New Log Record
View Logsheets
Chart Trends

Add a Log Record for Chiller #: 1 at Main Chiller Plant.
 178

Please enter your readings into the form below, then click the "Add Record" button:

Log Record

Operator:	Tim
Reading Date:	August 24, 2001 180
Reading Time:	9:32 AM 182
Condenser Readings	
Inlet Water Temp:	<input type="text"/> °F 184
Outlet Water Temp:	<input type="text"/> °F 186
Refrigerant Temp:	<input type="text"/> °F 188
Condenser Pressure:	<input type="text"/> PSIG 190
Actual Condenser Water Pressure Drop:	<input type="text"/> PSIG 192
Evaporator Readings	
Inlet Water Temp:	<input type="text"/> °F 194
Outlet Water Temp:	<input type="text"/> °F 196
Refrigerant Temp:	<input type="text"/> °F 198
Evaporator Pressure:	<input type="text"/> In. Hg. 200
Actual Chill Water Pressure Drop:	<input type="text"/> PSIG 202

FIG. 11A

10034785 5B4E001

<i>Compressor Readings</i>	
Oil Pressure (High):	<input type="text"/> lb. 204
Oil Sump Temp:	<input type="text"/> °F 206
Oil Level:	<input type="text"/> % 208
Bearing Temp:	<input type="text"/> °F 210
Run Hours:	<input type="text"/> 212
Purge Pumpout Time:	<input type="text"/> 214
<i>Electrical Readings</i>	
Amps Phase 1:	<input type="text"/> 216
Amps Phase 2:	<input type="text"/> 218
Amps Phase 3:	<input type="text"/> 220
Volts Phase 1:	<input type="text"/> 222
Volts Phase 2:	<input type="text"/> 224
Volts Phase 3:	<input type="text"/> 226
<i>Operator Notes</i>	
<div style="border: 1px solid black; padding: 10px; min-height: 100px;"> <p style="text-align: center;"><u>228</u></p> </div>	
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> Add Log Record </div> 230	

FIG. 11B

ChillerCheck Main
Chiller #1 Main Page
Maint. Records
Add Maint. Record
Add Log Record
View Logsheet
Chart Trends

CHILLERCHECK.COM

Efficiency Calculation for Chiller #1 at Admin Bldg.
 Reading taken on October 10, 2001 at 1:50 PM

163 Results 165

Target Cost to Run for Year	\$ 54,583
Actual Cost to Run for Year	\$ 65,993
Cost of Efficiency Loss	\$ 11,410
Efficiency Loss	20.9%

Detailed Cost of Efficiency Loss

Problem	Efficiency Loss	\$ Cost	Solution
Fouled Tubes - Condenser	9.5%	\$ 5,187	Fix it.
Non-condensables - Condenser	11.4%	\$ 6,222	Fix it.

Your Condenser Water Flow is 3.6% below design.

Your Evaporator Water Flow is 21.9% below design.

There is an electrical imbalance that may be decreasing the performance of your Chiller.
 The voltage imbalance is 3.62%.

The % load at this reading time was 88.9%.

[Back to the main page for this Chiller.](#)

FIG. 12

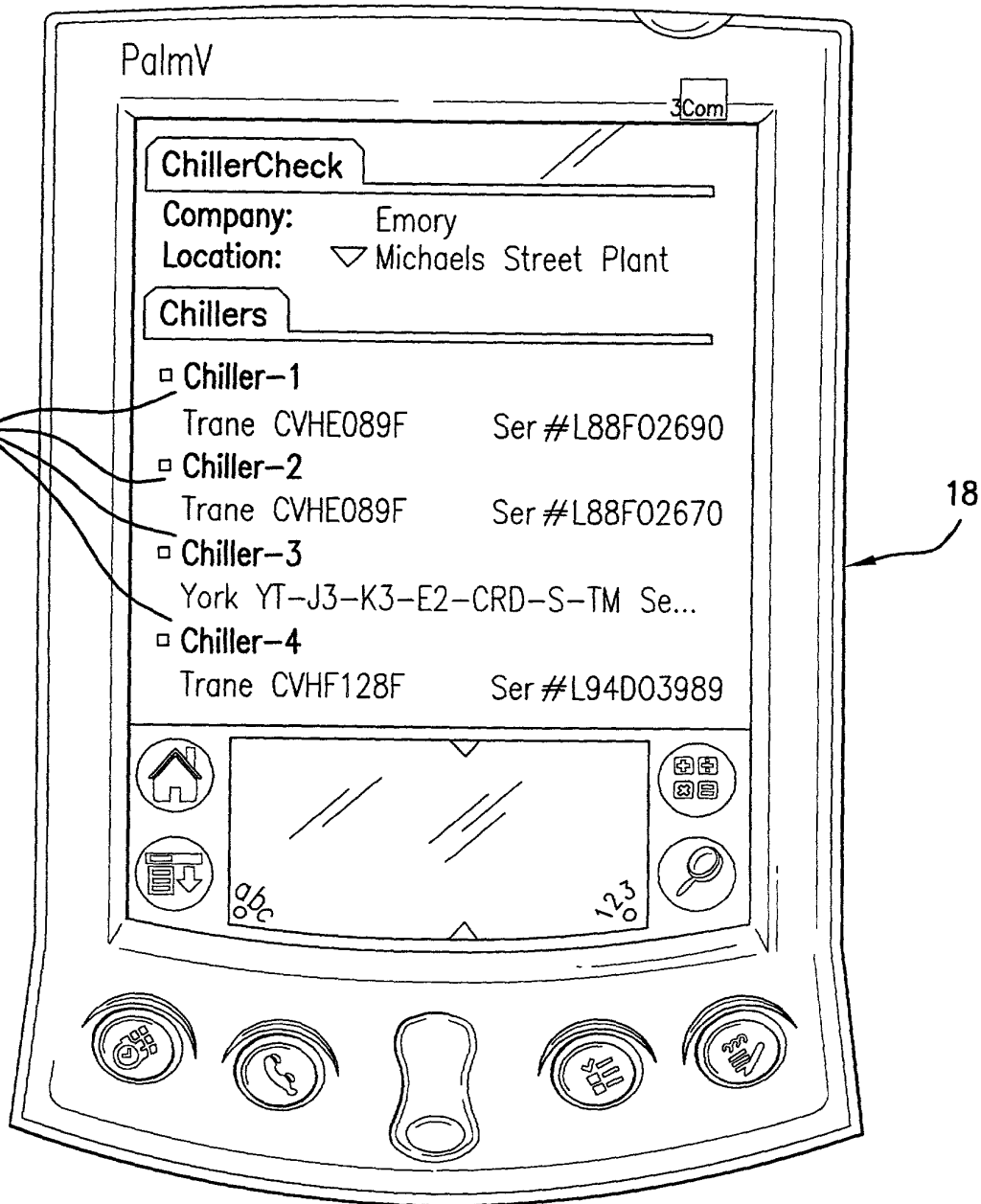


FIG.13

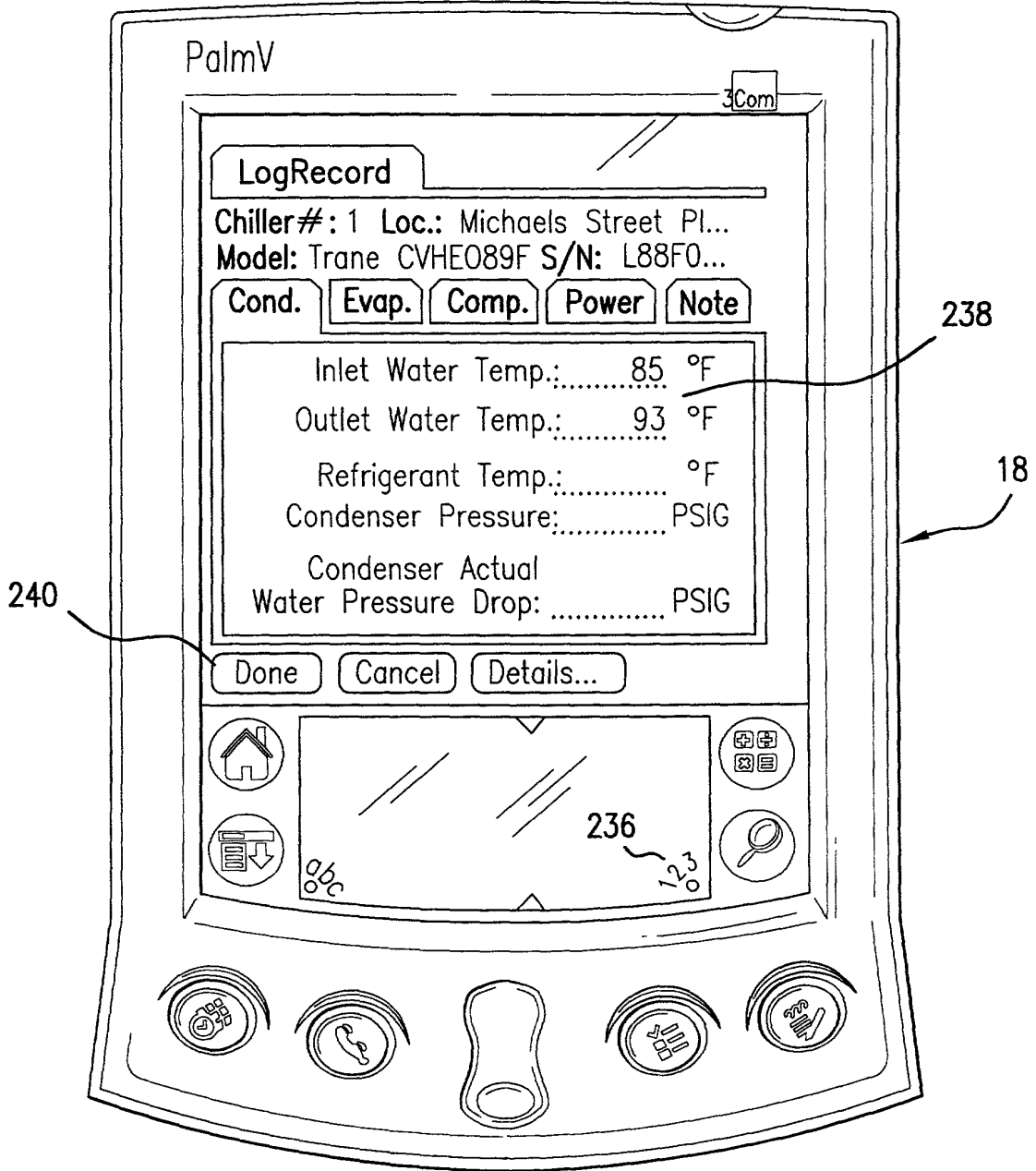


FIG. 14

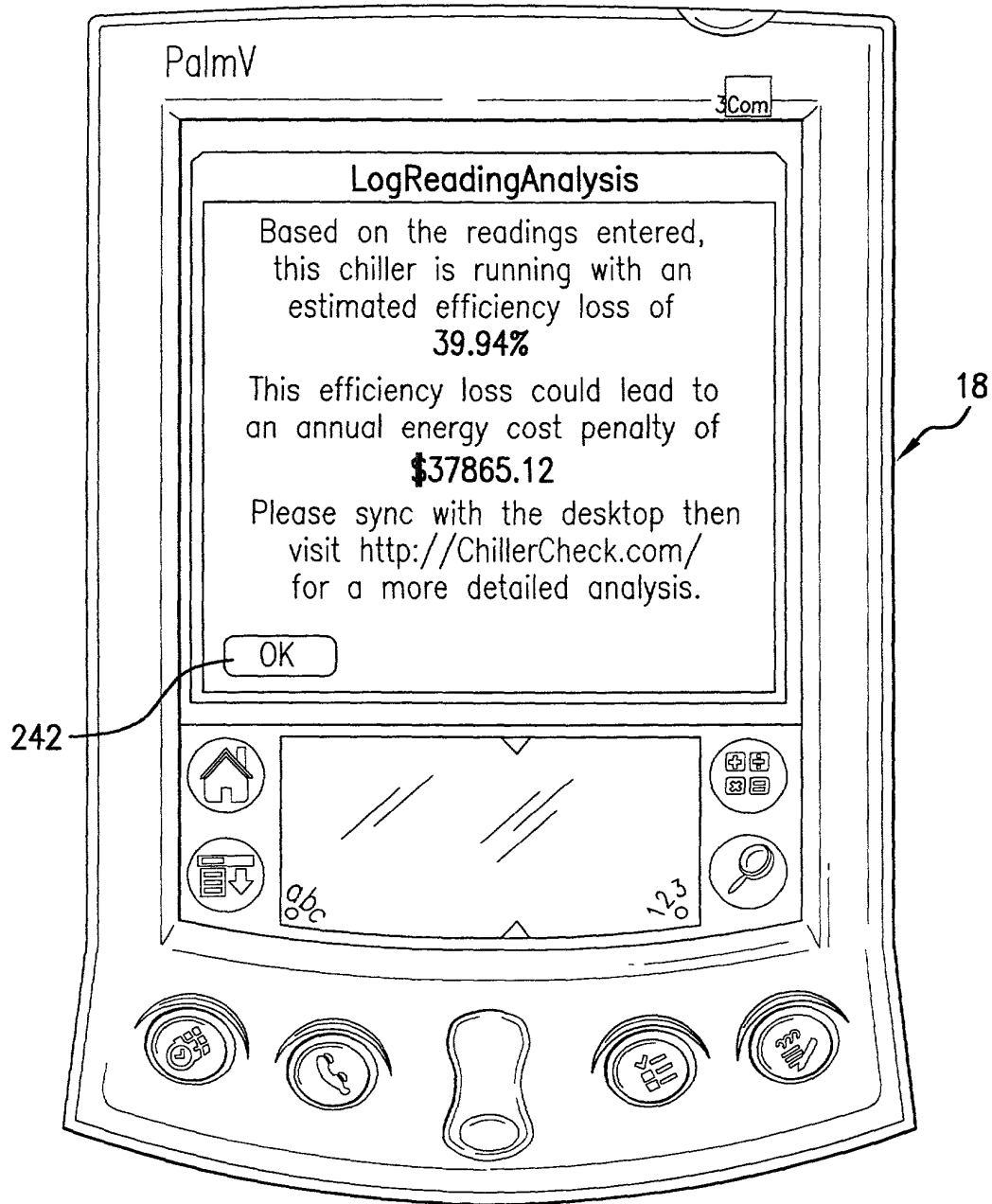


FIG. 15

ChillerCheck Main	Chiller #1 Main Page	Maint. Records	Add Maint. Record	Add Log Record	View Logsheet	Chart Trends
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Add Maintenance Record for Chiller #1 at Admin Bldg.

Please fill in all information in the form below, then click the "Add Maintenance Record" button.
 You will then be taken back to the Maintenance page for this chiller.

Maintenance Information

Annual Maintenance Date:	Select a Month	Day	Year
Oil Maintenance			
Oil Change Date:	Select a Month	Day	Year
Date Oil Added:	Select a Month	Day	Year
Quantity of Oil Added (Gallons):			
Oil Analysis Date:	Select a Month	Day	Year

CONT'D ON FIG.16A-1

FIG. 16A

CONT'D FROM FIG.16A

Eddy Current Tests	
Eddy Current Test Date (Condenser):	Select a Month <input type="text"/> Day <input type="text"/> Year <input type="text"/>
Eddy Current Test Date (Evaporator):	Select a Month <input type="text"/> Day <input type="text"/> Year <input type="text"/>
Major Stop Inspection (compressor teardown)	
Major Stop Inspection:	Select a Month <input type="text"/> Day <input type="text"/> Year <input type="text"/>
Refrigerant Maintenance	
Refrigerant Analysis Date:	Select a Month <input type="text"/> Day <input type="text"/> Year <input type="text"/>
Date Refrigerant Added:	Select a Month <input type="text"/> Day <input type="text"/> Year <input type="text"/>
Quantity of Refrigerant Added: (Pounds):	<input type="text"/>
Tube Cleaning	
Condenser Tube Cleaning Date:	Select a Month <input type="text"/> Day <input type="text"/> Year <input type="text"/>
Evaporator Tube Cleaning Date:	Select a Month <input type="text"/> Day <input type="text"/> Year <input type="text"/>
Purge Maintenance	
Purge Tank Reclaim Date:	Select a Month <input type="text"/> Day <input type="text"/> Year <input type="text"/>
Purge Run Time Reading When Tank Reclaimed:	<input type="text"/>

CONT'D ON FIG.16B

FIG. 16A-1

10034785-16A-1

Inventor: Lawrence J. Seigel
 Title: "METHOD AND SYSTEM FOR EVALUATING THE EFFICIENCY
 OF AN AIR CONDITIONING APPARATUS"
 Serial No.: 10/034,785
 Docket No.: 03237.0001U2
 Filing Date: December 27, 2001
 Contact: Lawrence D. Maxwell, Esq. (404) 688-0770 Sheet 25 of 27

CONT'D FROM FIG.16A-1

Purge Filter Dryer Change Date:		Select a Month ▼	Day ▼	Year ▼
Major Repairs				
Major Repair Date:		Select a Month ▼	Day ▼	Year ▼
Major Repair Description:		<div style="border: 1px solid black; height: 100px; width: 100%;"></div>		
Notes				
Maintenance Notes: (You may enter a note about any type of maintenance):		<div style="border: 1px solid black; height: 100px; width: 100%;"></div>		
Add Maintenance Record				

FIG. 16B

2004290 "584E001"

204290 "SE4E00T

ChillerCheck Main

Chiller #1 Main Page

Maint. Records

Add Maint. Record

Add Log Record

View Logsheet

Chart Trends

CHILLERCHECK.COM

Maintenance Records for Chiller #: 1 at Admin Bldg.

Below is a list of the most recent Maintenance Operations for your Chiller #1. You may click on the name of a Maintenance Type to view all records of that type.

Maintenance Type	Most Recent Maintenance
Annual Maintenance:	October 18, 2001
Oil Maintenance	
Oil Change:	October 18, 2001
Oil Analysis:	October 1, 2001
Eddy Current Tests	
Condenser Eddy Current:	September 9, 2001
Evaporator Eddy Current:	September 10, 2001
Major Stop Inspection (compressor teardown)	
Major Stop:	January 3, 2000

CONT'D ON FIG.17-1

FIG.17

Inventor: Lawrence J. Seigel
 Title: "METHOD AND SYSTEM FOR EVALUATING THE EFFICIENCY
 OF AN AIR CONDITIONING APPARATUS"
 Serial No.: 10/034,785
 Docket No.: 03237 0001U2
 Filing Date: December 27, 2001
 Contact: Lawrence D. Maxwell, Esq. (404) 688-0770 Sheet 27 of 27

CONT'D FROM FIG.17

Refrigerant Maintenance	
<u>Refrigerant Analysis:</u>	January 3, 2000
<u>Refrigerant Added:</u>	August 23, 2001 – Quantity: 100 Pounds
Tube Cleaning	
<u>Condenser Tube Cleaning:</u>	October 19, 2001
<u>Evaporator Tube Cleaning:</u>	February 5, 2000
Purge Maintenance	
<u>Purge Tank Reclaim:</u>	February 7, 2001 – Purge Run Time at Change: 1212123
Major Repairs	
<u>Major Repair:</u>	April 4, 2000 Repair Description: motor burnout
Maintenance Notes	
<u>Notes:</u>	November 5, 2001 Note: starter problems resulted in burnout

FIG.17-1

204290-524001